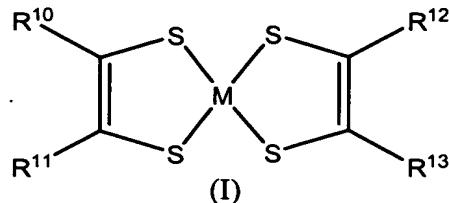


CLAIMS

1. An IR-absorbing dye suitable for formulating a water-based inkjet ink, said dye being of formula (I):



wherein:

M is selected from Ni, Pd or Pt;

10 R<sup>10</sup> and R<sup>11</sup> are independently selected from C<sub>1-30</sub> hydrocarbyl, or R<sup>10</sup> and R<sup>11</sup> together are joined to form a C<sub>2-30</sub> hydrocarbylene group;

R<sup>12</sup> and R<sup>13</sup> are independently selected from C<sub>1-30</sub> hydrocarbyl, or R<sup>12</sup> and R<sup>13</sup> together are joined to form a C<sub>2-30</sub> hydrocarbylene group;

wherein at least one of R<sup>10</sup>, R<sup>11</sup>, R<sup>12</sup> or R<sup>13</sup> comprises a hydrophilic group.

15 2. The dye of claim 1, wherein said hydrophilic group is selected from a PEG chain; an ammonium group; an acid group, including salts thereof; or a sulfonamide group.

3. The dye of claim 1, wherein said hydrophilic group is of formula -CO<sub>2</sub>Z, -SO<sub>3</sub>Z, -OSO<sub>3</sub>Z, -PO<sub>3</sub>Z<sub>2</sub> or -OPO<sub>3</sub>Z<sub>2</sub>, wherein Z is H or a water-soluble cation.

20 4. The dye of claim 3, wherein Z is selected from Li<sup>+</sup>, Na<sup>+</sup> or K<sup>+</sup>.

5. The dye of claim 1, wherein said hydrophilic group is a sulfonic acid group or a metal salt thereof.

25 6. The dye of claim 1, wherein said hydrophilic group is -SO<sub>3</sub>Na or -SO<sub>3</sub>K.

7. The dye of claim 1, wherein at least one of R<sup>10</sup>, R<sup>11</sup>, R<sup>12</sup> or R<sup>13</sup> comprises a moiety suitable for reducing intermolecular interactions.

30 8. The dye of claim 7, wherein said moiety suitable for reducing intermolecular interactions is a polymer.

9. The dye of claim 7, wherein said moiety suitable for reducing intermolecular interactions is a bridged cyclic group.

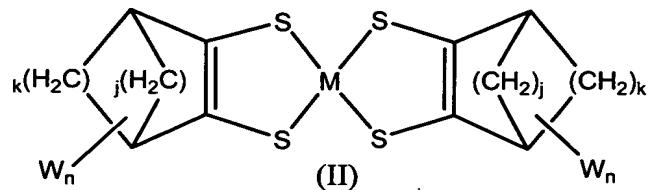
10. The dye of claim 9, wherein R<sup>10</sup> and R<sup>11</sup> together are joined to form a bridged cyclic group.

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11. The dye of claim 9, wherein R<sup>12</sup> and R<sup>13</sup> together are joined to form a bridged cyclic group.

12. The dye of claim 1, wherein M is Ni.

10 13. An IR-absorbing dye according to claim 1, said dye being of formula (II):



wherein:

15 M is selected from Ni, Pd or Pt;

j is selected from 0, 1, 2, 3 or 4;

k is selected from 0, 1, 2, 3 or 4;

n is selected from 1, 2 or 3;

W is a hydrophilic group;

20 up to three -(CH<sub>2</sub>)<sub>j</sub> groups in the carbocycle may be optionally replaced by a group independently selected from -C(O)-, -NH-, -S-, -O-;

up to three -CH- groups in the carbocycle may be optionally replaced by -N-;

up to four H atoms in the carbocycle may be optionally replaced by a group independently selected from C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkoxy, C<sub>5-12</sub> aryl, C<sub>5-12</sub> arylalkyl, halogen, hydroxyl or amino; and

25 provided that at least one of j or k is greater than 0.

14. The dye of claim 13, wherein M is Ni.

15. The dye of claim 13, wherein j is 1 and k is 2.

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16. The dye of claim 15 comprising a -C(C<sub>1-4</sub> alkyl)<sub>2</sub>- bridging group.

17. The dye of claim 13, wherein n is 1.

18. The dye of claim 13, wherein W is selected from a substituent comprising a PEG chain; a substituent comprising an ammonium group; a substituent comprising an acid group, including salts thereof; or a substituent comprising a sulfonamide group.

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19. The dye of claim 13, wherein W is a substituent comprising a group of formula  $-\text{CO}_2\text{Z}$ ,  $-\text{SO}_3\text{Z}$ ,  $-\text{OSO}_3\text{Z}$ ,  $-\text{PO}_3\text{Z}_2$  or  $-\text{OPO}_3\text{Z}_2$ , wherein Z is H or a water-soluble cation.

10 20. The dye of claim 13, wherein W is of formula  $-(\text{CH}_2)_t-\text{SO}_3\text{Z}$ , wherein t is 0 or an integer from 1 to 6, and Z is H or a water-soluble cation.

21. The dye of claim 13, wherein W is of formula  $-\text{CH}_2\text{SO}_3\text{H}$ ,  $-\text{CH}_2\text{SO}_3\text{Na}$  or  $-\text{CH}_2\text{SO}_3\text{K}$ .

15 22. An inkjet ink comprising a dye according to claim 1.

23. An inkjet ink comprising a dye according to claim 1 and a singlet oxygen quencher.

24. An inkjet ink comprising a dye according to claim 1, said dye being preselected to minimize visible

20 absorption by reducing intermolecular interactions between adjacent dye molecules.

25. An inkjet printer comprising a printhead in fluid communication with at least one ink reservoir, wherein said at least one ink reservoir comprises an inkjet ink according to claim 22.

26. The inkjet printer of claim 25, wherein said printhead comprises:

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a plurality of nozzles;

a bubble forming chamber corresponding to each of the nozzles respectively, the bubble forming chambers adapted to contain ejectable liquid; and

a heater element disposed in each of the bubble forming chambers

30 respectively, the heater element configured for thermal contact with the ejectable liquid; such that,

heating the heater element to a temperature above the boiling point of the ejectable liquid forms a gas bubble that causes the ejection of a drop of the ejectable liquid from the nozzle; wherein,

35 the heater element is suspended in the ink chamber such that during use at least a portion of the heater element is encircled by, and in direct contact with, the ejectable fluid.

27. An ink cartridge for an inkjet printer, said ink cartridge comprising an inkjet ink according to claim 22.

28. The ink cartridge of claim 27, wherein said cartridge comprises:  
a housing defining a plurality of storage areas wherein at least one of the storage areas contains colorant  
5 for printing information that is visible to the human eye and at least one of the other storage areas contains an inkjet ink according to claim 22.

29. A substrate having a dye according to claim 1 disposed thereon.

10 30. The substrate of claim 29, wherein said dye is disposed in the form of coded data.

31. The substrate of claim 30 comprising an interface surface and wherein the coded data is disposed over a substantial portion of said interface surface.

15 32. The substrate of claim 31, which is a paper sheet, a label, a tag, a packaging material or a product item.

33. A method of enabling entry of data into a computer system via a printed form, the form containing human-readable information and machine-readable coded data, the coded data being indicative of an identity of the form and of a plurality of reference points of the form, the method including the steps of:  
20 receiving, in the computer system and from a sensing device, indicating data regarding the identity of the form and a position of the sensing device relative to the form, the sensing device, when placed in an operative position relative to the form, generating the indicating data using at least some of the coded data;  
identifying, in the computer system and from the indicating data, at least one field of the form; and  
interpreting, in the computer system, at least some of the indicating data as it relates to the at least one  
25 field,  
wherein said coded data comprises an IR-absorbing dye according to claim 1.

34. The method of claim 33 in which the at least one field is associated with at least one zone of the form, the identifying step including identifying that the position of the sensing device is within the at least one zone.

30 35. The method of claim 34 in which the indicating data includes movement data regarding movement of the sensing device relative to the form, the sensing device generating the movement data using at least some of the coded data, the identifying step including identifying that the movement of the sensing device is at least partially within the at least one zone.

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36. A method of enabling entry of data into a computer system via a printed form, the form containing human-readable information and machine-readable coded data, the coded data being indicative of at least one field of the form, the method including the steps of:

5 receiving, in the computer system and from a sensing device, indicating data regarding the at least one field and including movement data regarding movement of the sensing device relative to the form, the sensing device, when moved relative to the form, generating the data regarding said at least one field using at least some of the coded data and generating the data regarding its own movement relative to the form; and  
interpreting, in the computer system, at least some of said indicating data as it relates to said at least one field,  
10 wherein said coded data comprises an IR-absorbing dye according to claim 1.

37. The method of claim 36 in which the sensing device generates the movement data using at least some of the coded data.

15 38. The method any one of claims 34, 35 and 36 in which the at least one field is a text field and the interpreting step includes converting at least some of the movement data to text.

39. The method any one of claims 34, 35 and 36 in which the at least one field is a drawing field.

20 40. The method any one of claims 34, 35 and 36 in which the at least one field is a checkbox field and the interpreting step includes interpreting at least some of the movement data as a check mark.

41. The method any one of claims 34, 35 and 36 in which the at least one field is a signature field and the interpreting step includes verifying that at least some of the movement data represents a signature of a user  
25 associated with the sensing device.

42. The method of claim 33 or claim 36 in which the at least one field is an action field and the interpreting step includes sending a message to an application associated with the action field.

30 43. The method of claim 42 in which the action field is a form submission action field and the message includes form data derived from at least one other field of the form.

44. A method of enabling entry of data into a computer system via a product item, the product item having a printed surface containing human-readable information and machine-readable coded data, the coded data being  
35 indicative of an identity of the product item, the method including the steps of:

(a) receiving, in the computer system and from a sensing device, indicating data regarding the identity of the product item, the sensing device, when placed in an operative position relative to the product item, generating the indicating data using at least some of the coded data; and

5 (b) recording, in the computer system and using the indicating data, information relating to the product item, wherein said coded data comprises an IR-absorbing dye according to claim 1.

45. A method of enabling retrieval of data from a computer system via a product item, the product item having a printed surface containing human-readable information and machine-readable coded data, the coded data being indicative of an identity of the product item, the method including the steps of:

10 (a) receiving, in the computer system and from a sensing device, indicating data regarding the identity of the product item, the sensing device, when placed in an operative position relative to the product item, generating the indicating data using at least some of the coded data;

(b) retrieving, in the computer system and using the indicating data, information relating to the product item; and

15 (c) outputting, from the computer system and to an output device, the information relating to the product item, the output device selected from the group comprising a display device and a printing device, wherein said coded data comprises an IR-absorbing dye according to claim 1.

46. The method of claim 44 or 45 in which the coded data is formed from a plurality of coded data portions, 20 each coded data portion being indicative of the identity of the product item.

47. The method of claim 44 or 45 in which the coded data is indicative of at least one of a UPC and an EPC associated with the product item.

25 48. The method of claim 33 or 36 in which the form is disposed on a surface of a product item and in which the coded data is indicative of an identity of the product item.

49. The method of claim 48 in which the coded data is formed from a plurality of coded data portions, each coded data portion being indicative of the identity of the product item.

30 50. The method of claim 48 in which the coded data is indicative of at least one of a UPC and an EPC associated with the product item.

51. The method of any one of claims 33, 36, 44 or 45 in which the coded data is substantially invisible to an 35 unaided human eye.